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Gas Journal

LIGHT - HEAT - POWER - BY-PRODUCTS

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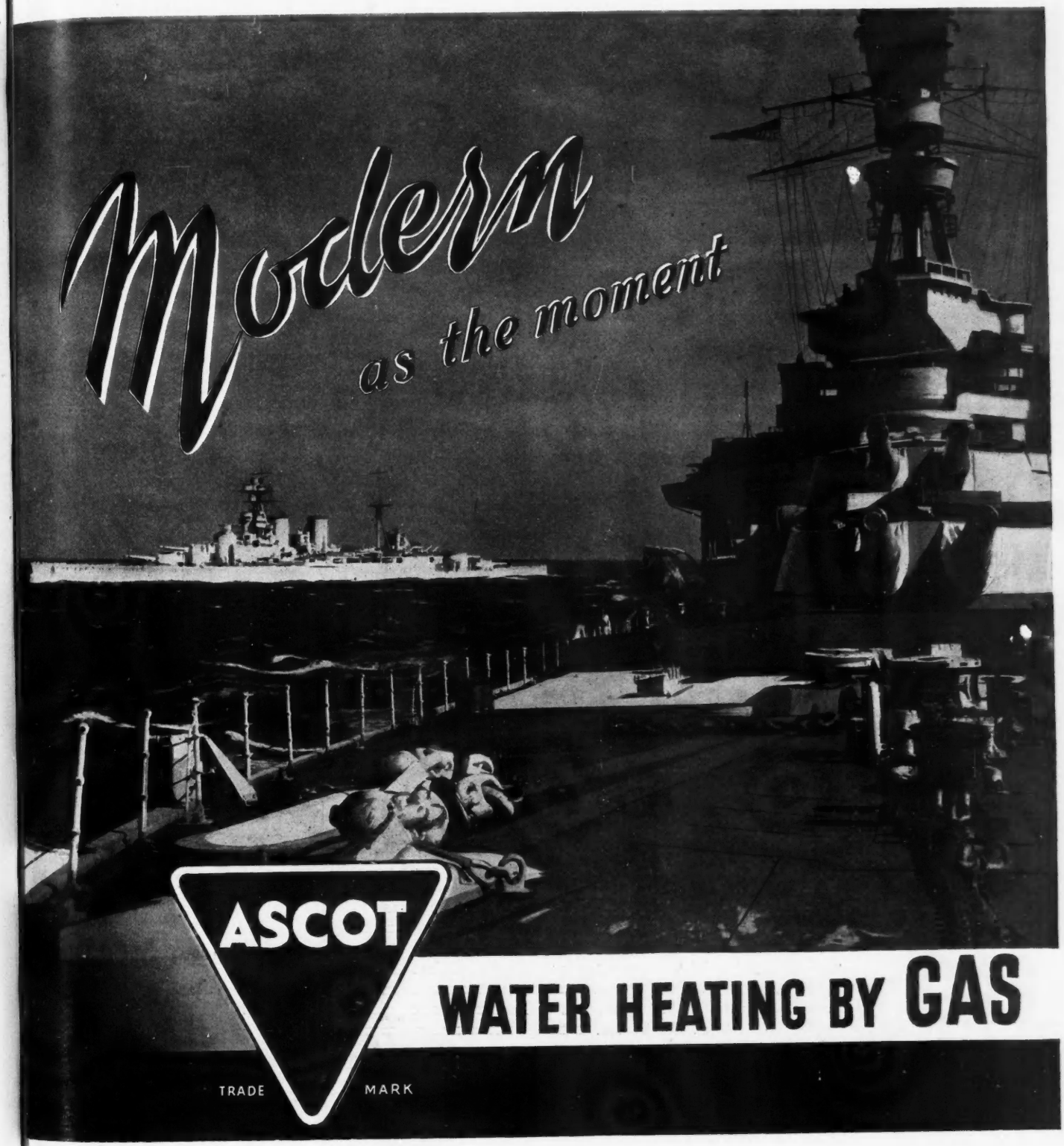

PUMPS
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Fig. 705. "SINGLE-RAM" STEAM-PUMP.

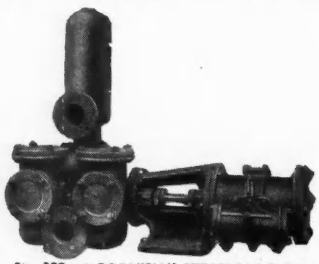

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

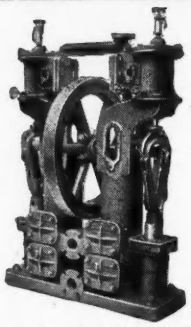

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

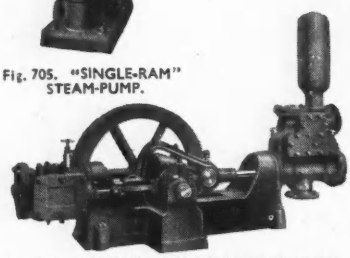

Fig. 6 0. "RELIABLE" PUMPING ENGINE FOR THIN TAR, AMMONIACAL LIQUOR, BENZOLE, LIGHT OILS AND WATER.

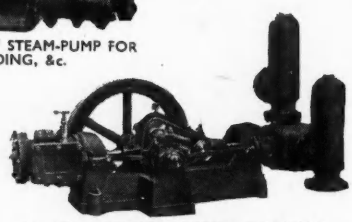

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND ALL THICK FLUIDS.

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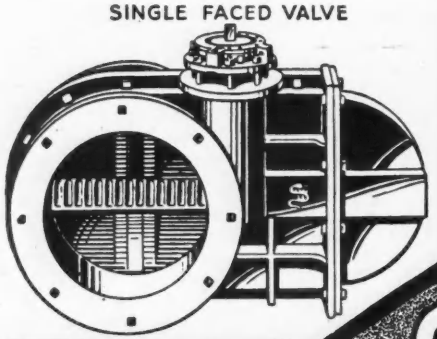

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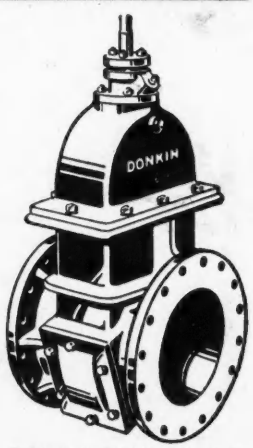

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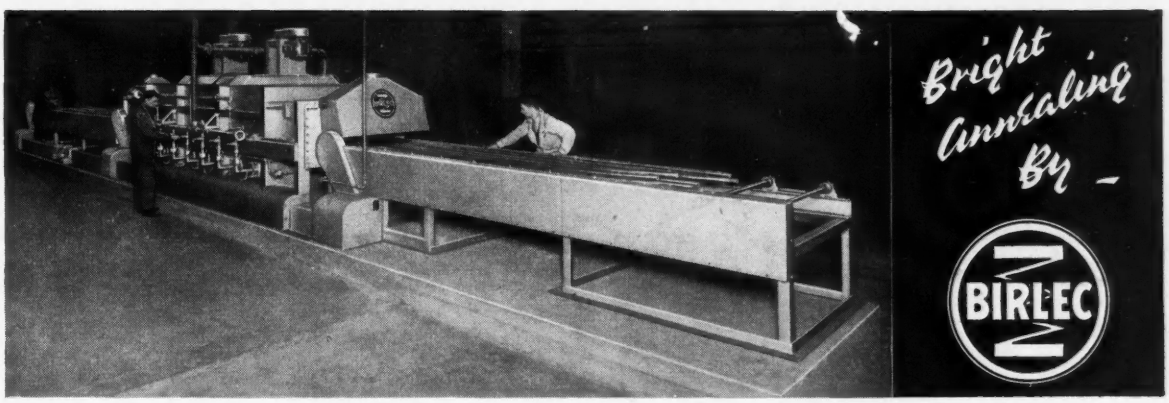

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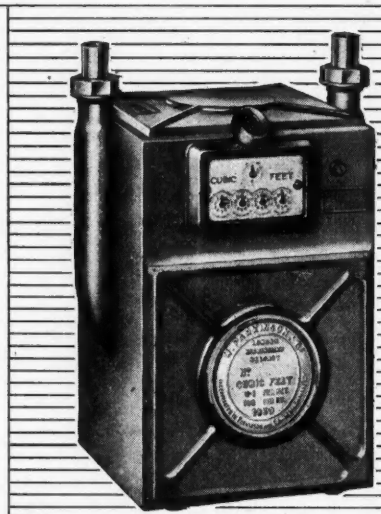

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p. 5

GAS JOURNAL, SEPT. 10, 1941

VOL. 235 93rd YEAR No. 4086

EDITORIAL NOTES

THE FUTURE GAS INDUSTRY

EVERYTHING points to a realization on the part of the Gas Industry that post-war conditions will demand of it a considerable measure of putting its house in order. Some—the more parochially-minded—go complacently on their way, even rejoicing perhaps at a fortuitous increase of load without being unduly troubled by the fact that only war conditions have brought it to them, and that no war endures for ever. Many others, including the more thinking men among us, take a very urgent view of the situation, and, indeed, are extremely troubled about our future. There were quite a number who were thus concerned for several years before the war, and the dangers they foresaw, and now foresee even more clearly, are by no means merely a direct result of the national and world upheaval. The Institution Symposium on the Gas Industry's future was symptomatic of a growing feeling of unrest; the great pity is, of course, that this feeling has become sufficiently widespread to gain real impetus only at a time when the day-to-day problem is quite enough in itself to engage to the full the attention of so many of us. But in the opinion of many whose opinion is usually worth hearing, thought for the future is as urgent as that for the immediate present, and, if the transition from thought to action is too long a process, they consider that gas has poor hope of a good place in the queue which is forming up for a real national fuel policy.

To discover what this policy will be is one of the problems, and we cannot pretend that we have the kind of contacts with Government circles which are likely to be truly revealing. We had very great initial hopes of what the British Gas Federation might do for the Industry. In many respects it has done useful work, to say which is, in fact, to damn it with faint praise. We cannot pretend that it has developed into the real driving force which is required to impress the Industry's views and capacities upon ministerial quarters—for years suspect, under successive régimes, of half-heartedness in our cause, in spite of generous expressions of admiration spoken from time to time in the congenial atmosphere of the luncheon or dinner table. There, then, is one of our difficulties—the lack of forceful representation on our side. On the other side, the Government Department with which we have always had to deal has had little, if any, scope for furthering our interests. We use the word " scope " advisedly because we impute no blame here. Sympathy we have had, and such help with our problems as has been possible, but really the functions allotted to the Board of Trade in its dealings with the Industry have long been little other than those of policeman, compared with which the sister fuel industries have enjoyed the services of salesmen. We offer no apology for reiterating these points which, it would seem, are obstacles to be faced before much progress can be made with the reforms unanimously approved at the Institution Meeting. The Institution makes an excellent forum, numbering among its membership representatives of all sides of the Industry. With commendable promptitude, under the leadership of its broad-minded and energetic new President, it has followed the June inquest by appointing small committees on four of the subjects which were discussed; these committees to make still further enquiries and recommendations. By all means let us have all available information at hand; even so it appears to us that the Institution will consider itself limited by its nature and its Charter from doing much beyond recommendation, and we shall still be faced with the problem of effective action. We hope, therefore, that ways and means will be the primary consideration of these committees, and that the Institution with its prestige and influence may really be the means of initiating the action which is so greatly desired, even if it has not the means to effect it itself.

With this great stirring in our ranks, and the general desire for concrete "recommendations" either to damn or to accept, would it be amiss to take down from our shelves, dust, and examine once again the very definite proposals which were made shortly before the war by the so-called Gas Group of Political and Economic Planning? By the Industry as a whole this work was cold-shouldered. It was, for one thing, by its very nature anonymous; it was regarded, perhaps, as being rather gratuitous; the word "political" in its title seemed forbidding. And so it was often relegated to the bookshelf, hardly read, and certainly not digested.

We do not now resuscitate it with the idea in any way of thrusting it down the Industry's throat; but for those who do wish to have ready-made recommendations upon which to base their own judgment, here is a complete set stated clearly, comprehensively, and without ambiguity. As we commented at the time of issue of the Report, it was obvious that great care had been exercised by the compilers, who must have had intimate knowledge of their subject in collating relevant facts and figures with such accuracy.

The salient points in the P.E.P. report of 1939 seem to us to have been (*a*) That the National Gas Council was unable to settle authoritatively matters of controversy within the Industry; (*b*) that the British Commercial Gas Association was not in a position to carry out major measures of reorganization; (*c*) that the British Gas Federation had not been an important influence. One of the chief proposals was the setting-up of a National Gas Authority. The functions of this Authority were defined as: To promote the grouping of undertakings within gas supply regions; to promote the rationalization of production and co-ordination of technical policy; to supervize nationally the marketing of coke and other by-products; to guide commercial policy in the Industry as a whole; to put forward schemes for recruitment and training of personnel.

These problems largely formed the basis of the Institution Symposium, and accordingly the P.E.P. Report with its definite recommendations would seem very topical. If it is read with an open mind, even a "gas commissioner" by some other name might seem less of an ogre. We say "might," and for the moment we leave it at that.

IN THE NORTH OF BRITAIN

LAST Friday saw a memorable meeting of Scottish gas engineers and managers in Edinburgh. The occasion was a gathering of the North British Association of Gas Managers and it constituted a record wartime attendance. Over 200 members of the Association were present, and they were in bonny fettle. The meeting was presided over by Mr. R. D. Keillor—a comparatively young man to occupy so high a position. The President, who conducted the meeting with conspicuous skill, appeared unmoved by the effects of past enemy air raids and his own personal troubles in this connexion. We suppose that this attitude towards untoward events is common to his colleagues in the Association and, indeed, throughout the Industry. It is an attitude which, we hope, is paving the way to courageous post-war planning and reconstruction. Planning for the future must be taken in hand now. As for reconstruction, this also is needed now and will be essential after the war; and it must be borne in mind that the war may be a long one.

Mr. Keillor was well supported. Among those present

throughout the proceedings was Sir Frederick West, President of The Institution of Gas Engineers. He told his hearers of the steps the Institution has taken in appointing committees to enquire into and make recommendations on questions such as standard calorific value, sulphur removal from gas, and so on. We gained the impression that those present at the meeting were rather restless concerning this continuity of enquiry upon enquiry on ante-dated questions. Indeed, nowhere have we found more manifest than north of the Border the demand for leadership and action to which we have referred in our first Editorial note this week. They are indeed disappointed that called-for reforms remain so long imprisoned in the realms of pious hopes. There was talk among the members of lack of guidance and resolution regarding the Gas Industry's present policy and that to be framed for putting into action after the war. The cause of the Gas Industry in regard to consumer interest and its own capacity to satisfy consumer demand is the basic consideration; and they feel that through lack of unification within our Industry we are not doing what is possible. What is needed is not so much a matter of compromise as a question of firm and discriminate leadership of the dominant type. Sectional interests will have to disappear. A former Prime Minister renowned for his prowess in the classics was wont to say "Wait and see." If the Gas Industry waits long enough it will see well enough. It will see that what it could have gained for the community (and incidentally for its own good as a vital national service) will have been lost. We emphasize that this is no time for waiting and inaction.

The N.B.A. Meeting was undoubtedly a great success—the while, as we have suggested, there was abroad this spirit of restlessness or impatience regarding the Industry's policy as a whole. We came to the conclusion that most gas executives would be only too ready to sink their differences once the Gas Industry could speak as an Industry. Doubtless there will be some grumbles about change, but "nothing is so permanent as change." We will not, however, for the moment delve more deeply into a situation which is apparent and which must be exercising the minds of all thinkers in our Industry.

The "high light" of the meeting was the William Young Memorial Lecture. It was given by Mr. Dean Chandler, of the South Metropolitan Gas Company. The Lecture, delivered in masterly fashion, was, we know, very greatly appreciated and quickly gave rise not only to thought but to considerable verbal expression of opinion. The Lecture is published *in extenso* in our issue to-day. We shall have more to say about it later, though we may reiterate our view that we cannot—*under present conditions and likely conditions in the immediate future*—subscribe to the opinion that coke should be regarded as a charge on gas manufacture. This does not cloud our hope that complete gasification effected by new methods under investigation will eventually reduce the cost of the effective gaseous therm to that of the effective thermal output in use of solid smokeless fuel (labour considerations, and so on, taken into account).

After the meeting there was a pleasant luncheon. Among the speeches was one by Mr. Hector M'Neill, M.P. for Greenock, whose remarks concerning the coal situation were to our mind exceedingly optimistic. We think his audience would agree with us in this. We think that the situation—as far as the Gas Industry is concerned—is not quite so rosy as Mr. M'Neill pictured it. A report of the entire proceedings will appear in our columns next week.

Hot Taps to go Cold

The first steps in what is intended to develop into a nation-wide campaign to conserve fuel for war purposes have been taken by the Mines Department, which is issuing special appeals to hotels, restaurants, clubs, offices, blocks of flats, and stores, as well as to households, to exercise the strictest economy in the ues of all fuels, whether for heating or lighting. Whitehall is setting an example by cutting off its hot water supplies during the day, and in future 400,000 civil servants occupying 18,000 buildings will find that from 9 a.m. to 7 p.m. the hot water taps, which have never let them down since modern water heating installations were perfected, will provide them with cold water only. For those on duty overnight, from 7 p.m. to 9 a.m., or who sleep in their offices, there will be a hot water supply, but the temperature will be strictly limited. Instructions have been issued by the Ministry of Works and Buildings to stokers in all Government buildings to this effect, and they have also been ordered to restrict the heat of rooms in the winter to 60° F. because each degree above that limit would put up the fuel consumption by 5%. It is of interest to note from a Press notice from the Ministry about this economy move that the peacetime consumption of fuel by the Government amounted to some 400,000 tons of coal and coke per annum. The example of Government Departments, including the Service Departments, is to be followed by the Metropolitan Police and other authorities, and all the industries concerned with fuel supplies are co-operating to make the scope of the campaign nation-wide.

Tar Prices

A Firm interested in our "Gas Products" prices has written to ask whether we expect shortly to be able to resume the weekly crude tar quotation which was a feature for many years, and formed the basis of so many contracts. We have again discussed possibilities with our Market Correspondent, but in his opinion there is unfortunately still no price for pitch to-day which could fairly be stated to represent a free market value. As long as this condition prevails, he is satisfied that to give a price in the "JOURNAL" for tar would almost certainly involve injustice either to the producer or to the distiller.

In his view there is, however, nothing to prevent any distiller from getting together with his producer to agree a fair price for crude tar over a past period and thus settling the matter. Our Correspondent knows of several cases in which this method has been quite successfully adopted.

Personal

Mr. GEORGE DUNCAN, Works Manager with the Newcastle-on-Tyne and Gateshead Gas Company, has retired after 45 years' service. He has been presented by his colleagues with a salmon rod, the gift being handed over by Mr. E. Crowther, General Manager and Chief Engineer. Recently, it will be recalled, Mr. Duncan was awarded the M.B.E. for his work in putting out incendiary bombs which fell on top of a gasholder during a night air raid last April.

* * *

Mr. HARRY FRIEDMAN, late of Ascot Gas Water Heaters, Ltd., has joined Parkinson & Cowan (Gas Meters), Ltd. He will be connected with the management of two new Parkinson and Cowan factories at present engaged on work of national importance.

* * *

Owing to a breakdown in health, Mr. F. R. G. GRANT, Engineer, Manager, and Secretary of the St. Ives Corporation Gas Department, will retire at the end of September. Mr. Grant has spent 52 years in the Gas Industry, nearly 23 of which he has served in his present capacity.

* * *

We much regret an error in recording the appointment of Mr. LEACH as successor to Mr. Sandon Stubbs at Liverpool. Mr. Leach's second initial is H., not R. as given on p. 321, Aug. 27, and in our Directory amendments on p. 357, Sept. 3.

Obituary

Mr. JOSEPH PARK, who retired last year from the position of Engineer, Manager and Secretary of the Hemsworth, Grimethorpe, and District Gas Company, has died aged 52. Mr. Park had held his official post with the Company for 20 years, and since his retirement had been a Director and Consulting Engineer of the Undertaking which is now a constituent Company of the United Kingdom Gas Corporation, Ltd.

London Juniors

A General Meeting of the London and Southern District Junior Gas Association was held at the Westminster Technical Institute on Friday, Aug. 29, when a Paper was read by Mr. P. Turnbull, of the Gas Light & Coke Company, on "Some of the Applications of Electricity in the Gas Industry."

The Paper dealt with the choice of supply systems—*i.e.*, A.C. or D.C.—and then gave details of the following applications:

(1) Mercury arc rectifier—glass bulb type. Description—operation and performance figure.

(2) Magnetic separators for removal of tramp iron from run-of-mine coal, oxide, &c. A description of the assembly and operation.

(3) Thomas recording gas calorimeter. General description, working principles and the operation of a typical installation.

(4) Electrostatic precipitation as applied to tar fog extraction. Short history—general description of electrical equipment and gas treating process for a typical installation.

In the absence of Mr. F. O. Hawes the Chair was taken by the Senior Vice-President, Mr. G. Dougill. Despite a poor attendance a very good discussion resulted.

A vote of thanks to Mr Turnbull was proposed by Mr. H. Moys, of the Commercial Gas Company.

Calculation of Gas Consumption per Consumer from Available Statistics and Deductions Regarding Possible Future Consumption

By W. E. le B. DIAMOND, M.A., Ph.D., A.I.C., F.C.I.S.,

Assistant Secretary, The Institution of Gas Engineers

FROM time to time statements and discussions have appeared in the Press about the consumption of gas per consumer by different sections of the community and opinions have been expressed on the "saturation point" or maximum consumption. The writer does not remember noticing in any of these articles a reference to family incomes and the amount which an average family might be prepared to spend on fuel and light. On the other hand, information regarding consumption of gas for commercial and industrial purposes is difficult to obtain. No doubt most undertakings know the approximate amount of gas which they supply for commercial and industrial use, but since such consumers are classified as "ordinary consumers," the number of such consumers and the amount of gas consumed by them is not available in published statistics. An attempt has been made to solve this problem, as shown below, by using statistics which are available concerning families and income levels. These latter statistics have also been used to show the additional potential amount which might be spent on gas and/or coke.

Since these calculations are based on pre-war figures, it might be said that they will have no relation to post-war standards of living. While that may be true, it is considered that the amount a family of any section of the community is prepared to spend on fuel and light will not be greatly altered. If there is to be any extended development of tariffs in the Gas Industry after the war, the calculations given below tend to show that so far as published information is concerned, adequate statistics concerning consumption of gas by different sections of the community are not available.

It is hoped, however, that the attention which is now drawn to the need for adequate statistical information and its relation to possible potential developments of different markets will be helpful in considering post-war plans.

Statistics from the Board of Trade Returns for 1937.

Number of Prepayment Consumers.	*Number of Ordinary Consumers.*
7,007,204	4,002,541
Gas sold 118,067,959 1,000 cu.ft.	175,810,559 1,000 cu.ft.

Converting to therms at an average calorific value of 470 (an actual estimate, taking into account the quantity of gas sold and the declared calorific value, of the average C.V.=469), the gas sold is equivalent to

Prepayment Consumers 554,919,407 therms and
Ordinary Consumers 826,309,627 therms.

This gives an average consumption per consumer per annum for:

(i) Prepayment Consumers of 79 therms, and
(ii) *All* ordinary consumers of 206 therms.

Population and family statistics (Mid 1937*) from the "Home Market,"* 1939 *edition:*

(i) Total population of Great Britain, 46,008,000.

Total Number of Families.	*Population not in Families.*
12,115,000	2,206,000

Estimated number of families in 1941: 12,500,000.

(ii) Social Status of Families:

	Families.
Grade A with an income of £10 per week or over ...	= 5.2% = 635,500
Grade B with an income of less than £10 but more than £4	= 21.3% = 2,580,300
Grade C_1 with an income of less than £4 but more than £2 10s.	= 37.8% = 4,581,000
Grade C_2 with an income of less than £2 10s.	= 35.7% = 4,318,000

(iii) Allowing for the 1,000,000 engaged in agriculture, of which 220,000 are farmers or farm bailiffs, and for other inhabitants of rural areas, it may be estimated that approximately 1,400,000 families made up of 200,000 Grade A, 200,000 Grade B, 500,000 Grade C_1, 500,000 Grade C_2 are not connected to a gas supply.

Deducting these families from the totals in (ii) above, the remainder is made up o

Grade A families 435,500	= 2,815,800 Grades A and B.
Grade B families 2,380,300	
Grade C_1 families 4,081,000	= 7,899,000 Grades C_1 and C_2.
Grade C_2 families 3,818,000	
10,714,800	

Estimate of the Average Consumption of Ordinary and Industrial Consumers.

If it be assumed, from the foregoing figures, that all the prepayment consumers are in the C_1 and C_2 Grade families, this would leave a difference of 881,796 families in these grades (excluding those in rural areas) using other fuel for cooking and lighting. It is known, for example, that there are a large number of miners using only raw coal.

Of the 4,002,541 "ordinary consumers," which include industrial and commercial consumers, let it be assumed that the 2,815,800 Grade A and Grade B families are ordinary consumers. Then it is not unreasonable to assume that the difference (4,002,541—2,815,800) of 1,186,741 is accounted for by industrial and commercial consumers.

The estimated industrial sales for Great Britain in 1937 (*Gas World* Year Book, 1938, plus an estimate for some of the larger gas undertakings for which no figures were given) were : 69,600.7 million cu.ft. Converting to therms at an average C.V. of 470=327,123,290 therms, which gives an average consumption by industrial and commercial users of 276 therms per annum.

The total consumption of gas by all ordinary consumers in 1937 was

175,810,559 mill. cu.ft., equivalent to	826,309,627 therms.
deducting industrial sales =	327,123,290 ,,
which gives	499,186,337 therms

taken by 2,815,800 ordinary consumers in Grade A and B families giving an annual consumption per consumer of 177 therms.

Summarizing:

(i) Average consumption in therms per annum:

Prepayment consumers, approx.	80 therms.
All ordinary consumers approx.	206 ,,

(ii) Industrial ordinary consumers, approx. ... ... 276 therms.
Ordinary consumers Grades A and B families approx. 177 ,,

Comparison of these statistics with those given in P.E.P. Report, and deductions regarding possible future consumption.

(1) *Prepayment consumers.*

7,007,204 consumers in Grades C_1 and C_2 families have an average annual consumption of, say, 80 therms per annum.

The discrepancy between this figure and the figure of 90 therms per annum given in P.E.P. Report (Graph fig. 8, p. 73) is due to the fact that for the latter figure a C.V. of 500 has been used to convert cubic feet to therms, but since only approximately 38% of the prepayment consumers have a supply of C.V. of 500 or over, this C.V. is considered to be too high. It would probably be more correct to assume that the annual consumption of prepayment consumers is 80 therms per annum—*i.e.*, using the more correct figure for the average C.V. of 470.

The average weekly expenditure of these Grade C_1 and C_2 families on fuel and light is 6s. 5d. (*Ministry of Labour Gazette*, December, 1940). It may be divided into an expenditure of 5s. 2½d. in July and 7s. 0½d. in January. Of this expenditure an average of 3s. 2d. is spent on coal and 1s. 5½d. on gas. This is equivalent to about 1½ therms per week at about 11d. per therm.

If half the expenditure on coal could be replaced by gas at, say, 6d. per therm, leaving 1s. 8d. for expenditure on coke (Kensal House scheme 1s. 7d. per week is spent on coke), approximately another 150 therms per annum could be purchased by these 7,000,000 consumers, or a total 1,050 million therms at a cost of £52,500,000.

This estimate of possible expansion does not allow for any increase in the number of families, slum clearance, or other new housing schemes. It has been estimated that the number of families in 1941 would be approximately 12,500,000, or an increase over 1937 of 385,000. If the relative proportion of Grade A and B families to Grade C_1 and C_2 families remained the same, there would be an increase of some 280,000 Grade C families, most of whom would be potential prepayment consumers.

It must be noted that between 1930 and 1938 the number of prepayment consumers showed a steady—practically linear—increase from year to year; with a total increase in number of approximately 1,750,000. The number of ordinary consumers remained almost stationary at between 3,950,000 and 4,000,000.

(2) *Ordinary consumers.*

(*a*) *Domestic.*—If the previous analysis of "ordinary" consumers is reasonable, then there are about 2,815,800 Grade A and B consumers having an average consumption of 177 therms per annum or approximately 3½ therms per week. This estimate of ordinary domestic consumers, based on family statistics, does not take into account those households using electric cookers. The number of electric cookers in use in 1936 (P.E.P. Report) was 650,000, some of which are no doubt used by commercial consumers. It is probable, therefore, that the number of ordinary domestic users of gas should be decreased by this number, with a corresponding increase (to account for the total number of ordinary consumers) in the number of industrial and commercial consumers.

The total number of Grade A and B consumers would therefore be about 2,165,800, and, if the corresponding number of Grade A and Grade B families using gas remained the same, there would be 335,500 Grade A families and 1,830,300 Grade B families. It is, however, probable that the number of families in Grade A using electric cookers

and having an "all-in" service would be more than the 100,000 allowed for.

The 1,830,300 Grade B families have an average expenditure on fuel and light of 6s. 2d. to 7s. 7d. (*Home Market* Table XXVIII, p. 101).

If the 3½ therms of gas are purchased at a flat rate of 11d. per therm or 3s. per week, 3s. 2d. to 4s. 7d. per week is being spent on coal and light.

Most of these families will have electric light and consume up to 4 or more units of electricity at a cost of, say, 1s. 8d. to 2s. 6d. per week, the balance of 1s. 6d. to 2s. being spent on solid fuel, which could be replaced in part or wholly by gas and coke.

These cost of living figures (quoted from *Home Market*) are derived from the Survey of Merseyside, 1934, and the *Journal* of the Royal Statistical Society, 1928.

If they are comparable with the Ministry of Labour's figures for the Grade C families, it would appear that the Grade B families are using more gas for space heating, &c.. and also more for cooking, corresponding to the increased weekly expenditure on food, while the Grade C families use more coal for cooking and use mainly gas lighting.

(*b*) *Industrial.*—It was assumed that 1,186,741 industrial and commercial users—that is, 29.6% of the total ordinary consumers—used 327,123,290 therms, or 39.6% of the total consumed by all "ordinary" consumers, giving an average consumption per consumer of 276 therms per annum. Or if the additional 650,000 consumers are deducted from the "family" consumers, to allow for electric cooking, and added to the total of industrial, we have 1,836,741 consuming 442,963,027 therms, an average consumption per consumer of approximately 240 therms per annum. (The number of therms, 442,963,027, is calculated by deducting the amount consumed by the revised number of ordinary domestic consumers: 2,165,800 at 177 therms per annum = 383,346,600 therms, from the total for all ordinary consumers: 826,309,627.) 45.8% of the total ordinary consumers are commercial and industrial users and they consume 53.6% of the total gas sold to all ordinary consumers. The comparatively low consumption of 240 therms per annum indicates the possibility of considerable expansion in such uses of gas.

I have pleasure in thanking the President of The Institution of Gas Engineers (Sir Frederick J. West, C.B.E.) for kind permission to publish this note.

Glasgow Councillors Face Bribery Charge

Charged with jointly receiving bribes amounting in all to £225 in connexion with a gas contract three Glasgow Town Councillors have been cited to appear for trial at the High Court, Edinburgh, on Sept. 23. They are charged under the Public Bodies (Corrupt Practices) Act, 1889.

The indictment alleges that Thomas Wilson, Alexander Ritchie, and Joseph Taylor, being members and Councillors of Glasgow Corporation, a public body within the meaning of the Public Bodies (Corrupt Practices) Act, 1889, and Gas Chambers and Coke Ovens, Ltd., Artillery House, Westminster, London, having, on Aug. 11, 1939, tendered for the contract of work to be carried out by the Corporation at their Provan Gas-Works, Glasgow, while acting in conjunction with each other, and with Hugh Campbell, at present a prisoner in Barlinnie, as part of a deputation from the Committee of Gas Supply, to interview officials of the Company, and having visited and examined work done by them in England, they did, on Oct. 19 and 20, 1939, at Artillery House, London; the Royal Automobile Club, London; and the Gas-Works, Brentford, corruptly solicit from Arthur Henry Lymn, Chairman of the Company, a gift, fee, or reward, as an inducement or reward for undertaking to use their aid and influence to procure acceptance of the tender; and, further, they did, acting in conjunction, on Oct. 20, 1939, at Artillery House, Westminster, corruptly receive from Lymn, by the hands of Hugh Campbell, £100 in name of payment and towards said gift, fee, or reward; and they did, further, on various occasions between Dec. 1 and 31, 1940, in the City Chambers, Glasgow, and in the office at 108, West Regent Street, Glasgow, occupied by William Miller Duncan Anderson, or elsewhere in Glasgow, corruptly receive from Lymn, by the hands of Anderson, sums of £25, £50, and £50 respectively in name of further payments towards said gift, fee, or reward.

W.W-D. Electro-Detarrers

The Whessoe Company inform us that they have recently received orders for W.W-D. Electro-Detarrers from the Wellington (Salop) Gas Company (controlled by the Severn Valley Gas Corporation, Ltd.), the Southport Gas Department, the Rushden and Higham Ferrers District Gas Company, and the Exeter Gaslight & Coke Company. This brings the total number of orders received for W.W-D. Detarrers to 51 complete plants, with an aggregate daily capacity of 462 million cu.ft. of gas. Of these plants, 29 are for the Gas Industry, 17 for the Coking Industry, and 5 are for producer gas cleaning.

These plants comprise 72 W.W-D. gas treating vessels, 47 H.T. generator sets (6 of which have steam engine drive and one turbine drive), and 18 of the latest static selenium rectifier sets (six of which are supplied with A.C. from alternator sets operating off Works low tension D.C. supplies).

The Whessoe Company can claim that this is a most satisfactory record, particularly in view of the fact that it is less than ten years ago that the W.W-D. Detarrer was first introduced.

PATENT

Tar for Road Making

Tar used in binding road surfaces is the subject of a patent (No. 538,308; application date Jan. 19, 1940) granted to the Midland Tar Distillers, Ltd., and D. W. Parkes. The pitch, and therefore the binder, contain insoluble matter. That insoluble in toluene is generally called free carbon, although in fact this is a misnomer, as the so-called free carbon can be divided into a fraction soluble in pyridine, usually known as C_2, and a fraction insoluble in both toluene and pyridine, usually known as C_1. The C_1 fraction approximates to pure carbon, and is generally regarded simply as a finely-divided filler. The C_2 fraction is commonly accepted as a valuable binding constituent in the refined tar, and one which should be present in the final binder.

The patent is based on the discovery that tars from which both the C_1 and C_2 fractions have been removed have weathering properties far better than most of normal refined tars, and further that they can be coloured by appropriate pigments so that road surfaces bound by them can be made in many colours. This is of great importance for camouflage purposes. The invention comprises, therefore, producing a tar binder by oiling-back a pitch from which both the C_1 and C_2 fractions have been removed. Pigments may be incorporated in such a binder, but preferably they are added during the mixing of the binder with the aggregate.

In carrying out the invention crude tar may first be distilled to remove water and part of the oil content. The pitch that forms the residue may then be extracted with a solvent in which the C_1 and C_2 fractions are insoluble, and the solvent may be removed by distillation. There are a number of suitable solvents from which to choose. The best are naphtha, particularly heavy coal tar naphtha, kerosene, and white spirit. In general, the solvent extraction process will be carried out hot. Thus, the product obtained by dehydration and distillation of the crude tar can suitably be heated to from 100° to 110°C. and have added to it a quantity of naphtha at a temperature of 55° to 85°C. When this is done, a bituminous mass containing the C_1 and C_2 fractions separates out. The extract is separated and is cooled and allowed to settle. As a result, a resinous substance is thrown down. For the complete separation of this resinous substance a period of several days is generally needed. The bulk of it separates out, however, in from 18 to 24 hours. It is advisable to remove as much of this resinous substance as possible because its presence is apt to dull the final colour of the tar binder. The extent to which it is removed, if at all, will naturally depend upon the particular result which is aimed at.

The clarified extract is distilled for the removal of the solvent and the residue is oiled back in the usual manner to the required viscosity.

The amount of binder which can be extracted by this method depends, of course, upon the nature of the starting material. Hard pitches extracted with naphtha are generally found to yield only about 30% of their weight as extract, whereas a medium soft pitch may yield as much as 50%.

For oiling back the extract, any of the usual oils can be used. Clean creosote is very suitable, but where the best weathering properties are to be obtained, the high-boiling oils obtained by distilling medium soft pitch are preferred.

The removal of the C_1 and C_2 fractions can be effected otherwise than by the use of a solvent-extraction process. One very successful method is to distil or coke pitch produced from crude tar and to separate from the remainder of the distillate (or product driven off in the coking oven) the later fraction, which has the consistency of soft pitch. This fraction when formed devoid of the C_1 and C_2 fractions (which are left behind as residue in the distillation) and when oiled back with a suitable oil to the required viscosity has very good weathering properties and is of light colour.

The binder in accordance with the invention can be usefully used for the manufacture of coloured tar macadam. For example, the aggregate can be heated to from 70° to 80°C. and may have the tar binder applied to it at about the same temperature. If the colouring matter is then added, it is found to disperse readily over the coated aggregate. The colouring matter may, however, be added to the binder before the latter is applied to the aggregate.

Good results have been obtained by applying 25 lb. of the tar binder to 500 lb. of aggregate and adding thereto 5 lb. of titanium white pigment. A brown coloured macadam is thus produced.

To obtain a green macadam, 20 lb. of a green pigment may be used. It is found advantageous in this and other cases to use a small amount, for example 3 or 4 lb. of titanium white in addition to the other pigment, because the white helps to bring out the other colours.

The tar binder produced in accordance with the invention can be used for all the purposes to which ordinary refined tar is applied.

The Board of Trade informs us that as from Sept. 6 the Offices of the Gas Administration are at New Oxford House, Bloomsbury Way, London, W.C. 1. Tel. Holborn 4311.

The Ministry of Supply has issued the Control of Iron and Steel (No. 15) Order, 1941, Direction No. 2, which extends until September 30, the period during which orders for all iron products, except pig iron, but including iron castings, may be fulfilled without being authorized by the responsible Government Department. This extension applies only to orders placed before September 1, which would not, if the No. 8 order had remained in force, have required to be licensed. The exemption from licence or other authority of small purchases of iron castings has been extended from quantities tno exceeding 2 cwt. to quantities not exceeding 5 cwt.

SOME REFLECTIONS ON MATTERS OF IMPORTANCE TO THE GAS INDUSTRY

THE WILLIAM YOUNG MEMORIAL LECTURE

Given before the North British Association of Gas Managers on Sept. 5

By DEAN CHANDLER,
South Metropolitan Gas Company.

THE invitation to deliver the William Young Memorial Lecture this year confers on me an honour of which I am deeply conscious. I suggested to your President that there were others more worthy of the honour, but he replied with a repetition of his invitation and that, too, in such kindly terms that I had no alternative to compliance with his wish.

The name of the great man whom we honour to-day and of whom it was said, "He fertilized the Gas Industry with ideas," revives a personal memory of events many years ago. The circumstances were these. My father, who may be remembered by some of your senior members for his association with the Kirkham and Chandler washer-scrubber, had acquired a concession to mine cannel coal in North Wales, with a view to its distillation for gas enrichment. At that time the London standard was sixteen candle gas, which, it might not be out of place to recall, meant that the gas when burned in a standard Argand test burner at the rate of five cubic feet an hour, had to give illumination equal to that from sixteen standard sperm candles. Unfortunately for the project the standard value was reduced to fourteen candles and that was readily obtainable without enrichment with cannel gas. The question of a profitable use for the cannel coal was put to William Young, whom my father knew. Under his direction a small-scale plant was designed for experiments with a view to increasing the yield of oil. I remember the coal was to be crushed and there was to be added a substance, the nature of which I do not know, but it was to function as an agent—we should now call it a catalyst—to promote the conversion of the coal substance into oil. The process was to be carried out in a specially constructed retort, to which steam was to be introduced. The idea did not pass beyond the initial stage. William Young, who had a most fertile imagination, may have been thinking along the lines which years later led to the evolution of the process known as hydrogenation. Not infrequently has it happened in the course of the history of applied science that inadequate facilities and ignorance of the precise conditions necessary and of the right materials to be used, have frustrated the successful realization of new ideas, and that may well have been the case nearly half a century ago. Here I would pay this tribute: there can be no surer proof of greatness in a scientific experimentalist than that, gifted with vision, he should persistently pursue the truth, and having found it, should translate his findings into practice. That was characteristic of the spirit and work of William Young. That some of his ideas did not come to maturity in his day is not surprising.

When your President invited me to give this lecture he left the choice of subject to me. That caused me more concern than the preparation of the Lecture. I could not escape the thought that you were expecting me to address you on one or other of the technical problems of the Gas Industry. Since the outbreak of war, however, matters of greater urgency have claimed attention, and war has compelled us to concentrate attention on problems vital to the war effort, and in consequence time and facilities for research such as is undertaken in peacetime have been curtailed.

The obvious course seemed to be to consider some of the problems which the war has raised, and their practical solution, but there are apparently good and sufficient reasons for not doing that, although it can be said in general terms that, called upon to maintain a service so essential to the community, the Gas Industry has good grounds for pride in its achievements. Medals and honours testify to the courage of the men in the Industry; their ingenuity, resourcefulness, and helpfulness in most trying circumstances, indeed all their mental and spiritual qualities, must await the end of the war to receive their tributes—if they have not by that time been forgotten as commonplaces. It may be said now, however, that in those areas which have been heavily raided, the Industry has found and fostered ways of keeping at work gas-fired equipment vital to the needs of the country's war industries. In addition, for the most part it has seldom failed to re-establish with remarkably little delay interrupted domestic gas supply in circumstances that would appear wellnigh incredible under peacetime conditions, and this has been made possible by excellent organization of the Industry as a whole as well as in its constituent undertakings.

In the circumstances I propose to take advantage of the opportunity to consider first a matter of importance which has a bearing not only on our own Industry, but on other related industries as well. Later I shall deal briefly with one or two matters of a more technical character. The views put forward may be approved by some, to others they may not be acceptable, but I hope that they have at least the merit of stimulating thought.

In a Royal Society of Arts lecture on "Coal Carbonization and its Importance in the Life of the Nation," E. V. Evans stated in connexion with gas and electricity—"A very confused condition has arisen between two great industries, each providing an important service and each anxious to add to the part it plays in promoting the common good. There is a great field for the extension of the electrical industry in the wider field of mechanical power for safer work and adding to physical human comfort. That portion of the domestic load which does not directly aim at a supply of heat can, with great National advantage, be taken by electricity, but there has arisen a high degree of overlapping and the public interests are suffering."

The last observation is one to which we might now with advantage give some thought, inspired with the spirit of self-sacrifice and co-operation which war has evoked. "The public interests are suffering." War has brought home to those of us who take a little trouble to think of it, that we as individuals are not quite so important as we sometimes incline to think, and that we must accept inconveniences, restrictions of personal liberty and the like, in order that the majority may benefit. At first some of the restrictions put upon us seemed unnecessary and perhaps intolerable, but time has accustomed us to them; we have got over our first shock and can see things in their true perspective. Perhaps we have learned to distinguish between necessities and luxuries. Conditions imposed upon us by our will, expressed through our elected representatives and t. eir executive staffs, have not touched the necessities, but they have shown us that as regular fare these bare necessities are not too palatable. We have, then, been forced into a keener appreciation of the not very happy circumstances of the under-privileged. Likewise we may have learned that some of our luxuries were largely matters of personal selfishness, obtained perhaps at some cost to less fortunate people who suffer the hardships arising from an imperfect economic order. There is nothing new in all this; it is as old as civilization, but its recognition ought by now to be shared by the majority and not by an idealistic few with little practical power.

In discussing this question I had instanced to me a school where it was the basis of their system that the school had first claim on the boys in their thoughts and energies, then came the house, and finally the individual. That this system could degenerate into an authoritarian glorification of the State was recognized, but it was pointed out that they had the safeguard that the greater the privilege attained in the school the greater was the responsibility, and that this responsibility was exercised entirely in the service of the school community. That system works successfully among youngsters who are naturally acquisitive, rebellious, independent, and arrogant in the exercise of power, and it should, therefore, not be beyond the compass of adult common sense and goodwill to extend the system into commercial and industrial life.

I mention that because it seems to illustrate the process which we shall have to adopt in the conduct of our Industry, and in our relations to our customers and to other industries, if the new spirit of reconstruction of our national and international life is not to find our Industry recalcitrant and reactionary. Let me bring a more practical aspect into this dissertation.

For the period of the war the gas and electricity supply industries have an official truce, and that should mean a breathing space in which we can take stock of ourselves and those engaged in similar business, in which we can form our conclusions without unnecessary irritations from the other side, and finally, one devoutly hopes, in which we can come together and plan a joint programme for the advancement of our interests, but always with

the "public interests" as the criterion. Is it too much to hope that those old ideas of civilization, typified by the school training I have cited, may now become the basis of an industrial and social system? I do not presume to guess the private views and hopes of the leaders of our Industry, but I feel assured that steps on these lines would meet with most ready approval by the rank and file. When in the past we have engaged in unrestricted, wasteful competitive activities it has been the little men who have had to do the unpleasant work, and the little man in the vast majority of cases is decent enough for that to be distasteful to him, even though it involves his livelihood. We have to achieve a new outlook so that if it is of no economic advantage to consumers to change from gas to electricity, or electricity to gas, the imagined advantage of one industry shall no longer require its representatives to damn its competitor by exaggerations and ill-founded statements as reasons for a change. By continually exchanging the apparatus of the unstable minded we merely pile up costs and the public interest suffers. There should be no more of the undignified scrambling for public lighting in which both sides set about slashing their charges, while the Lighting Authority aided and abetted presumably to obtain a benefit for the local rates. The winner obtained the business and wrote off the loss on it to advertising—overheads—and this was another item to keep up the cost of gas or electricity service to the public which was supposed to have benefited through low public lighting rates. We can all find instances of this sort of undesirable competition from which the public interests suffer.

Both gas and electricity have a great and growing part to play in public welfare and comfort, and that they can work in the closest co-operation is evidenced by the existence of upwards of twenty joint undertakings in this country and many more abroad, particularly in the U.S.A. These joint undertakings are apparently prosperous and it is to be presumed, therefore, that the two sections of the undertaking are able to develop in harmony and without impinging upon one another's legitimate spheres of usefulness. The various fields of activity for gas and electricity will be bases for exhaustive argument, but with the public good always the criterion it should be possible to hammer out agreement. Each has advantages which the other cannot claim. There is no gas equivalent to the electric vacuum cleaner, but, then, neither is there an electric equivalent to the gas poker for lighting solid fuel. Similar instances of exclusive uses can be multiplied, but there is then a range where one or other is to be preferred. For some purposes electricity is to be preferred—domestic and architectural lighting, motive power, for instance, but other electrical claims are not wholly supported by experience. It has been argued in favour of electricity for local heating that building costs are much reduced, since no flues are required to carry away the products from the combustion of fuels. The desirability of omitting flues has always been questioned on hygienic grounds, and the opinion that satisfactory ventilation cannot be obtained with air-bricks let into the wall is gaining strength even among bodies in whose interest it would appear to be that flues should be omitted. In the course of an investigation which we made about four years ago on the ventilating effect of air-bricks and unheated flues, one broad conclusion was that flues gave more uniform ventilation with changing wind direction and speed than air-bricks, which were subject to marked and most undesirable variations of effectiveness. These pointers indicate something of the complexity of the problem, which would have to be put through the "hammering-out" process.

While we are about it, why should we confine ourselves in co-operation to gas and electricity? Why not bring in coal as well? The ideal of the gas and electrical industries allying themselves politically *with* the coal industry instead of *against* it does not appear to me to be wildly impossible of achievement. The mere fact that the one undertaking which produces the coal sells it as such to the public as well as selling it as a raw material to other industries, which in turn sell a finished derivative to the same public, does not do away with the fact that they have a community of interest in the selling of more coal in one form or another. Gas and electricity are not foreigners to the coal industry, like the railways or shipping, which merely use coal as an incidental in the provision of a transport system, or the iron and steel industries, which do not sell a derivative of coal as their final product. Gas and electricity, like the coal merchant, are in essence selling coal. They perpetuate limited, sectional interests under existing economic methods, but with a more enlightened outlook they can support their common interests with a unification of working, incidentally to the public benefit. I have used the word "unification" there because we need something more generous and wholehearted than the rather grudging "co-operation" implies.

I do not want to labour this point, but I am saddened by the possibility that the fertile soil of the present time may be wasted and that our experience of the last war may be repeated. Who among us does not remember the crop of fine phrases which came up between 1914 and 1918, and who does not remember the tragic harvest of disillusionment which followed in the post-war years? This time our people have gone into the war with eyes open and minds clear and the war may yet produce great good. In co-partnership—an industrial and social ideal—the Gas Industry led in demonstrating that apparently opposed interests had in fact almost complete identity, and, if there does not seem to be a lead from the electricity and coal industries, let the Gas Industry, with the experience of reconciling antagonistic interests, make the gesture. If it is rebuffed, we shall at least have done our part, and we shall stand in a better position, when unification of some kind is then probably imposed upon us by Parliament. If they do not unify of their own accord, it is not difficult to imagine the bitter compromise which all three industries will have to bear after they have fought among themselves before an official tribunal. We should not, however, go grudgingly into voluntary unification as the lesser of two evils, but in a spirit of enthusiasm and goodwill.

While we have unification in the forefront of our minds, we can, I think, visualize closer co-operation with the chemical industry and still more with the oil industry. The coal industry can become still more the supplier of raw material for these industries. Some idea of the extent to which a country possessing coal deposits but only trivial petroleum resources can become self-dependent in respect to liquid fuel has been shown by Germany. There the means of increasing the oil supply is the processing of coal by low temperature retorting methods, and by hydrogenation and gasification By the distillation and cracking of coal tars, light motor fuel and "Diesel" oil, equal in quality to petroleum products, are being obtained. Germany's production of petroleum is only 0.22% of the world's production, but its own production of liquid fuel was about 35% of its consumption; that is, according to a statement at a Technical Conference at Magdeburg a few months before the war. Whenever German fuel technologists foregathered, stress was laid on the necessity to increase home production of liquid fuel. Admittedly their ultimate aims differ somewhat from ours. Imperial Chemical Industries demonstrated that by a similar process 165 gallons of motor spirit per ton of coal substance treated have been obtained. Not so long ago Sir Phillip Dawson said, "We are at the beginning of a new era in which coal is to be the raw material of manufacturing processes." We must ensure that instead of internecine warfare there must be joint effort by the sections working the various processes and by the supplier of the raw materials.

In the preparation of Standard Specifications conflicting or at least, jealous interests have come to a state of unification on detail work, and I do not believe that there are any physical or political reasons against unification. If there are personal reasons, then they must be suppressed by the sanction of powerful and informed opinion. It must be laid down immediately, however, that a specious, superficial arrangement is more a danger than a solution, and that our new basis of operation must be fundamental and far-reaching.

Some years ago the Coal Utilization Council was formed within the coal industry to safeguard and develop its interests. It concerned itself primarily with the use of raw coal for domestic heating—a reminder that the desirability of continuing the burning of raw coal in congested towns was being called into question, and that this use of coal was subject to increasing challenge. Feeling had grown that hygienic considerations might receive greater weight, and that, in view of economic advantages to be gained from using other fuels, the household coal market would be endangered. The organization represented a tightening-up in the corporate sense in the coal industry.

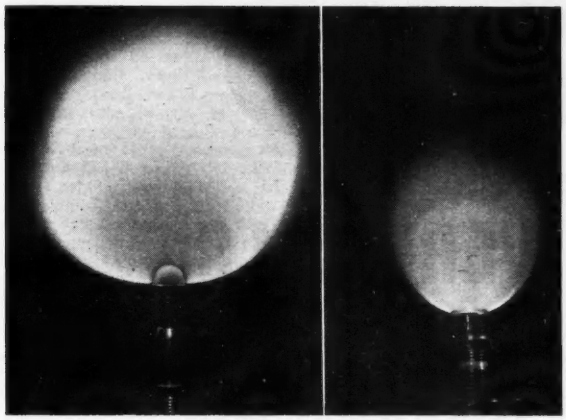
The electrical industry has vigorous, central control, but the Gas Industry has a very diffuse corporate structure and therefore stands at a considerable disadvantage when co-operation or unification is in question. There seems a clear case for the early establishment of an authoritative, as opposed to a merely advisory, organization in the Gas Industry to represent our interests when collaboration with other allied industries becomes an active matter. The other industries have their controlling bodies and can therefore act with greater energy than our not disunited, but loosely organized aggregation of units.

The ultimate aim would probably be a Coal and Coal Derivatives Utilization Board, embracing the coal, carbonizing, electricity, chemical and, to a large extent, a domestic oil industry. This last unit is included not in any fanciful or visionary sense, for with the Gas Industry working a complete gasification process on a possible tonnage of 45 million tons of coal a year, 900 million gallons of motor spirit or 70% of our

(*Continued on p. 407*)

pre-war consumption could be produced. The remaining 30% might possibly be produced by catalytic synthesis from gas during off-peak periods. We must not forget that large-scale trials of complete gasification processes might have been in progress now if the war had not intervened, and commercial development was the next step according to the promise which the systems seemed to offer. There is, indeed, a future of high promise for all these allied industries, given good-will and collaboration—unity.

The question may arise whether under unification all incentive or need for technical or administrative progress will disappear. Why should they? Each of the constituent industries in the combination will continue to deal with its own internal economy, and the public interest will still require that although wasteful competition is eliminated, the possibility of legitimate competition between the individual fuels as one or other brings about a technical advance sufficient to lower its costs, and make its use economic for hitherto unattainable purposes, will act always as a spur to technical improvement in all branches, since the best and cheapest service to the community is the joint undertakings' aim.



There is a growing realization that the purpose of the Gas Industry is primarily to produce gas at a price which will enable the general public and the industrialist to enjoy its manifest advantages. Although the sale of coke at a presumed remunerative price was increasing in pre-war days, gas still had to carry the costs of production, which coke was unable to bear, if it was to remain saleable. Carrying costs which should properly have been borne by a secondary product gas at normal flat rate charges stood no chance of increasing sales and could not, indeed, hold its own, with the result that tariffs of some kind were introduced fairly widely to bring the price of gas down to a level at which, having paid the full charges on the higher-price cooking, water heating, and occasional heating therms, it was able to compete in the continuous heating field. This course was necessary, as with the customary carbonizing methods, little or no reduction in the cost of gas manufacture was to be expected. Tariffs, whatever their basis or their purpose, have come to stay, since they offer to the public a useful commodity at a price equitable and economic to both seller and buyer.

The alternative method of obtaining cheap gas seemed to lie in the elimination, as far as possible, of the coke incubus, so that gas could be freed from the losses on coke. This indicated the evolution of complete gasification processes and their development to commercial propositions. To be an economic success the gasification of coke, by methods suitable for the production of a gas of calorific value and combustion characteristics similar to those of the coal gas, which it will accompany or replace, need not produce this gas at a lower price than the straight coal gas. If the complete gasification product works out at the same figure as the original coal gas only, the latter is freed from the penny a therm or so loss on coke and the combined process shows a saving. The complete gasification schemes ready for the commercial-scale trial stage, however, show promise of better results than this.

The Gas Industry, then, has two separate lines of approach to the cheap gas objective and these can be run together to varying degrees to serve the best interests of the community. There is no time now to go into the possibilities of standardization in price, appliance production, and other directions which changes in gas generation methods open to us.

In my introductory remarks I indicated that I would have something to say on matters of more immediate technical interest than the first part of my Address, and I now come to these.

Up till the introduction of the bunsen type burner and the Welsbach mantle, so suitable to be used in conjunction with it, much experiment and inventiveness went to the improvement of luminous flame burners. The standard for the sale of the gas itself was a luminosity standard—the candle—and standard burners were evolved for indicating the candle-power of the gas. These standards survived for a while after the bunsen burner had made them more of academic interest than practical utility, since even with the lighting burner the intrinsic luminosity of the gas flame had become not merely of no importance, but in some circumstances a nuisance. One may legitimately regret that interest focused itself so much upon lighting, since there was a wide field of usefulness, subsequently recognized, for burners of the luminous type in heating work. With the swing-over to bunsen burners for lighting interest in luminous burners faded and development work practically came to an end. That shortsightedness has been paid for by the Gas Industry. It was right and proper that the bunsen burner and aerated flame should be used with the Welsbach mantle for lighting, but the argument for using an aerated flame for heating purposes has never been so strong. Had the attraction of the new arrangement been less great, some of the present difficulties experienced with combustion characteristics might never have arisen.

The illustration showing the characteristic flames from a lighting burner and a heating burner with the same gas rate may give the reason why the luminous burner fell from grace as a heating medium. The aim of the lighting burner designer was to reduce the flow of air into the flame, and so to produce a large area of under-aerated gas with a great number of solid carbon particles to incandesce. Sugg and Bray recognized the need to restrict the flow of air into lighting burners, and indeed provided positive baffles. The reduction of air inflow also made it possible to keep up the temperature of the flame, and to obtain the maximum benefit from the operation of the Stefan-Boltzman fourth-power law. The insulating effect of steatite assisted in this purpose. The designer of a heating burner, on the other hand, aims to introduce air into the flame as rapidly as possible to produce a flame of small area and low luminosity. When the luminous burner was most popular, therefore, the very basis of its design militated against its adaptability for heating work. Years before the introduction of the bunsen burner Henry Banister, of the Chartered Gas Company, of Westminster, was able to say, " Abundant experiments in this country, performed by scientific men, and in France by Messrs. Dumas and Regnault, have satisfactorily demonstrated that it is possible to consume a given quantity of gas through two differently constructed burners, each burner consuming the same quantity of gas—one developing the full illuminating power of the gas, the other giving only heat, but no light." After that categoric statement one wonders whether the Gas Industry of the time was sufficiently clear-sighted when it attempted to use the lighting type of burner for heating work. Perhaps I am being wise after the event.

It must not be overlooked, either, that the abandonment of luminosity standards for calorific standards made possible the extraction of benzole, and this strengthened the possibility of developing the usefulness of burners of luminous type for heating work. The full story of the luminous burner has not yet been told; indeed, it is not yet by any means known. The results of experimental work by my Company over the last few years in the application of luminous burners to cooker ovens have already been published in the Technical Press. The first reports appeared in November, 1937, and as indicated in January and May, 1940, the initial satisfaction has continued, and continues to-day. As time goes on there will no doubt appear many interesting varieties based on luminous burners.

In discussing luminous burners it may reasonably be suggested that benzole-stripping should give a new impetus to their use. Our experience in the effect of benzole-stripping on bunsen burners may be of interest.

For some thirty years my Company has been making and selling lighting burners without gas and air regulators, both inlets being of fixed dimensions. The same policy was adopted in all appliances for heating, cooking, water-heating and so forth, embodying bunsen burners, and it will be appreciated, therefore, that with over 400,000 consumers we had several million burners with fixed gas and air ports. In the interests of efficiency, always a matter of first importance under Dr. Carpenter, the tolerances in design and manufacture were kept to a minimum and the gas had also to adhere to rigid standards, not merely the statutory standards of calorific value and chemical purity, but standards of our own devising for constancy of specific gravity and chemical composition. The design of burners was suited to the characteristics of our gas—primarily—

(*Continued on p. 410*)

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Gas Products Prices

The London Market

Sept. 8.

Prices of Coal Tar Products in the London market remain unchanged. Values are to-day approximately as follows:

Pitch is nominal; creosote about 5d.; refined tar 3¾d. to 4d.; pure toluene under the Ministry of Supply Toluene No. 2 Order 2s. 5d.; pure benzole 1s. 10d.; 95/160 solvent naphtha 2s. 5d. to 2s. 8d., and 90/160 pyridine 13s. 6d.; all per gallon naked; refined crystal naphthalene £23 per ton in bags; all *ex* Makers' Works.

The Provinces

Sept. 8.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 1s. 10d. (controlled by the Control of Toluene No. 2 Order, July 5, which fixes the maximum price at which this material may be sold). Coal tar, crude naphtha, in bulk, North, 10d. to 11d. Solvent naphtha, naked, North, 1s. 9d. to 1s. 10d. Heavy naphtha North, 1s. 6d. to 1s. 7½d. Creosote, *ex* works, in bulk, North, liquid and salty, 4½d. to 4¾d.; Scotland, 4¼d. to 4¾d.; low gravity, 4½d. to 4¾d. Fuel Grade, 4d. to 4¼d. Carbolic acid, 60's, 3s. 7½d. to 3s. 9d. Naphthalene, £12 to £15. Salts, 70s. to 80s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal. Heavy oil: Unfiltered anthracene oil (min. gr. 1,080), 5½d. to 5¾d.; filtered heavy oil (min. gr. 1,080), 5¾d. to 6d.; heavy anthracene oil gr. less than 1,080, 6d. to 6¼d.

*In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of this issue.

At a Recent Meeting of the Burntisland Town Council it was decided to fix the price of gas at 3s. 10d. per 1,000 cu.ft. for ordinary consumers and 4s. 3d. per 1,000 cu.ft. for prepayment consumers. These prices are 1d. per 1,000 cu.ft. lower than the present charges.

Tar Products in Scotland

GLASGOW, Sept. 6.

Production continues to find ready outlets and most prices are firm.

Refined tar is in moderate demand at fixed price of 4¾d. to 5d. per gallon for delivery in the home market, while export trade is less active at round 3½d. per gallon, both f.o.r. naked.

Creosote oil: Available supplies are being used to best advantage with prices steady as under: Specification oil, 5¾d. to 6d. per gallon; low gravity, 6½d. to 7d. per gallon; neutral oil, 6d. to 6½d. per gallon; all *ex* Works in bulk.

Cresylic acid: Various restrictions are making trading rather erratic. The following prices are nominal: Pale, 99/100%, 3s. 9d. to 4s. per gallon; Pale, 97/99%, 3s. 5d. to 3s. 8d. per gallon; Dark, 97/99%, 3s. to 3s. 3d. per gallon; all *ex* Works in buyers' packages.

Crude naphtha remains constant at 6½d. to 7½d. per gallon *ex* Works in bulk, according to quality.

Solvent naphtha: 90/160 grade is 1s. 8½d. to 1s. 9d. per gallon and 90/190 Heavy Naphtha is 1s. 4½d. to 1s. 5½d. per gallon.

Pyridines are without interest at round 14s. per gallon for 90/160 grade and 16s. per gallon for 90/140 grade.

The Coatbridge Gas Company, Ltd., has declared a final dividend of 9¼% on the original stock, making 14½% for the year, and 12s. 11⅜d. per share, making 19s. 11⅜d. per share for year. The Company has also intimated that, under authority granted by the Board of Trade, the declared calorific value of gas supplied by the Company will be reduced from 500 B.Th.U. to 450 B.Th.U. (gross) per cu.ft. as from Oct. 1.

Gas Stocks and Shares

Markets generally had a firm tone at the opening and more business was reported, especially in the gilt-edged section, but towards the end of the week interest slackened off and prices here and there were inclined to slip back. British Funds, however, remained strong throughout and a number finished fractionally higher—2½% Consols were marked *ex div.* on September 1 and closed ¼ down at 81½. Home rail junior stocks eased slightly on desultory selling, although the prior charges advanced fractionally. Industrials on the whole, apart from a few bright features, showed small changes. There was more activity among rubber shares, but after a strong opening oils, apart from Mexican Eagle shares, were inclined to ease off.

Except for a fair volume of business in the stocks of the larger undertakings there was less activity in the Gas Market last week. Prices, however, were maintained and with one exception the few changes were in an upward direction. Gas Light units were changing hands at slightly better prices than during the previous week when a drop of 1s. 3d. was recorded, but the quotation closed unchanged at 13s. A transaction in Bombay £1 shares at 20s. 7½d. was responsible for a shortening of the margin to 1s.

The following price changes were recorded during the week:

OFFICIAL LIST

Bombay	20/—21/-	+-/6d.
Bournemouth 7 p.c. max.	118—123	—2
Gas Light 3½ p.c. Red. Pref.	65—72	+1
Montevideo	55—60	+1
South Suburban Ord....	60—65	+1
United Kingdom Gas Corporation Ord.	13/—15/-	+-/6d.
Wandsworth Cons. (*x.d.*)	67—72	Sept. 1
,, 4 p.c. Pref. (*x.d.*) ...	65—70	,,

PROVINCIAL EXCHANGES

Bristol 5 p.c. max.	87—89	+½
Hartlepool Cons. (*x.d.*)	61—63	Aug. 25
Sheffield Cons. (*x.d.*)	108—110	,,

The Calorific Value of the gas supplied by the municipal works in Glasgow has been reduced from 470 B.Th.U. to 450 B.Th.U. as from Sept. 1.

The 125th Half Yearly Meeting of the Wisbech Lighting Company was held at Wisbech last week, when one of the chief items was to approve and sanction a superannuation and pensions scheme for the staff and employees, which was unanimously adopted. Mr. G. S. Gardiner, Chairman, presided, and said that during the past half year the results had been satisfactory. They recommended that the same dividends be paid as in the past half-year.

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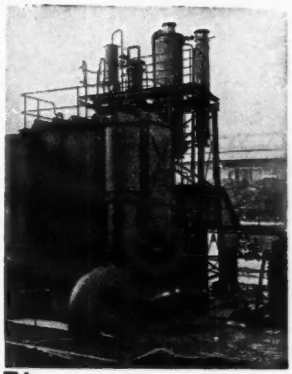
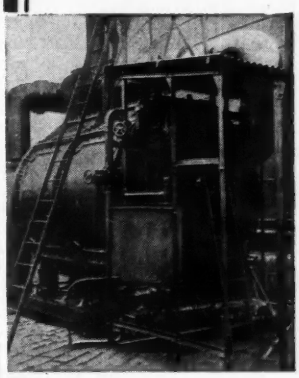


"Permac" Joints in a Gas Works.



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but with minor modifications, such as the substitution of a new ejector, they worked satisfactorily on other gases. About a year ago, however, we went over from a high calorific value, low specific gravity gas to a gas of lower calorific value and lower specific gravity, as we started benzole-stripping.

The volume analysis of the two gases and their specific gravities are given in the following table:

Calorific value	560	530
CO_2	1.6	1.6
C_nH_m	3.4	2.4
O_2	0.2	0.2
CO	6.8	6.9
CH_4	27.9	28.2
H_2	53.6	54.1
N_2	6.5	6.6
Specific gravity	0.40	0.375

Washing for benzole has reduced the unsaturated hydrocarbons by about 30% and the percentages of the other major constituents have risen proportionately. The calorific value has dropped by roughly 5% and the specific gravity by 6½%. The effect of the fall in specific gravity is to increase the flow of gas through an orifice of fixed size by 3⅛%, so that this does not quite compensate for the reduction in calorific value. The net effect is a fall of 2¼% in the B.Th.U. rate. We have not altered any ejectors.

The slight change in combustion characteristics of the gas has had no practical effect and neither this nor the slight drop in B.Th.U. rate has produced any trouble on the district. In spite of coal selection difficulties we still maintain a standard for constancy of specific gravity and chemical composition. The extended use of luminous burners would, of course, allow greater flexibility at the works. Our experience confirms in practice the laboratory conclusion that the removal of benzole from the gas does not materially affect combustion characteristics, and fear of the consequences in this direction need not, therefore, deter those who are contemplating the removal of this product.

An incidental advantage of the benzole-stripping is the reduction in the organic sulphur content of the gas. Conditions to-day require that sulphur be reduced to a minimum, and one may hope that its reduction, elimination if possible, will be insisted upon. For many years zealous advocates have agitated with greater or less publicity for sulphur removal, and indeed the history of this subject provides interesting sidelights on the mental processes of the Gas Industry. Before the introduction of the bunsen burner and the Welsbach mantle the gas engineer concentrated his efforts on the candle-power of his gas, but the light-giving capabilities of his diverse lighting burners attained only a low standard, necessitating the burning of relatively large volumes of gas for satisfactory illumination to be obtainable. Although ideas of satisfactory illumination were very different from to-day's standards, nevertheless, in the normally under-ventilated rooms the burning of this illuminating gas gave rise to complaint of smell and only the removal, or at least the drastic reduction, of sulphur would meet this complaint. The much higher luminous efficiency of the incandescent burner removed the complaint without touching the cause, since the gas consumption needed by the new arrangement was only one-sixth of that required by the older burners for the same light output. Sulphur was reprieved, but long-sighted men have occasionally returned to the attack upon it. It was in part responsible for the pan of water in front of the gas fire, which only five years or so ago was still being recommended by an instructor at one of our biggest teaching hospitals. It was responsible for much of the "fumes in the gas oven" propaganda, although this was mainly malicious and ill-informed, and I propose to return to this point. It was responsible in large measure for the "cast-iron" age in radiators lasting for years after it should have become just an unpleasant memory. It tended to discredit the water-heater. I am viewing this sulphur question from the consumer's point of view, because it is the consumer's impressions that have the most lasting effects on our business. I do not need to stress the technical grounds for the demand, "Sulphur must go." Tactful evasiveness failed to kill the sulphur question. Now the increased use of portable and other flueless appliances and the tendency towards lightness of weight in all appliances have again brought the sulphur question into prominence, and we must see that effective action follows. It is worth noting here that complete gasification would greatly reduce the total sulphur emission from carbonization products, since experimental work holds promise of the production of a gas with a sulphur content as low as 1 grain per 100 cu.ft.

A little earlier I referred to "fumes in the gas oven" propaganda, and I think it possible that you would be interested in some tests we made a few years back on the atmospheres in gas and electric ovens. No intelligent person ever had any idea that the generally admitted products of combustion, carbon dioxide and water, could have deleterious effects, since, apart from their universal existence, they are both likely to be evolved in the cooking process. The only other possibility seemed to be sulphur compounds, which the burning gas would produce, but which would not come from the electrical heating elements. Bearing in mind, however, that sulphur occurs in meat, fish, eggs, and vegetables, the possibility obviously existed that sulphur compounds would appear in the atmosphere of ovens regardless of the means employed to heat them. This, in fact, the observations established, typical figures being:

Cooker	Conditions	CO_2	SO_2	H_2S	Theoretical SO_2	Gas cu.ft. rate per hr.
		% by volume in products				
Electric	Cooking scones	2.4	*Nil*	*Nil*	—	—
,,	Cooking beef	0.5	0.0004	Trace	—	—
Gas (Bunsen)	Cooking scones	1.7	0.0017	*Nil*	0.0012	20.4
	Cooking beef	1.9	0.0008	,,	0.0019	14.5
Gas (Luminous burner)	Empty	4.9	0.0012	,,	0.0042	16.5
	Cooking scones	5.0	0.0015	,,	0.0051	17.0

The inconsistency of the gas figures suggested that some sulphur might be lost in condensation in the oven, and other experiments were therefore made with a heated glass tube as the cooker, air with or without small proportions of sulphur dioxide being admitted through flow meters. The tests with no sulphur admitted with the air were intended to represent the conditions in the electric oven and those when sulphur dioxide was admitted to simulate the atmosphere of a gas oven. The following results were obtained with beef cooked:

% SO_2 in air admitted	Total Sulphur (as SO_2 equivalent)
Nil	0.0031
0.0029	0.0104

There seems little doubt that the concentration of carbon dioxide and sulphur compounds in the oven atmosphere may depend at least as much upon the materials being cooked and the degree of ventilation of the oven (compare CO_2 in two gas ovens) as upon the use of either gas or electricity as source of heat. There need, however, be no fear that sulphur oxides will be taken up by the food. The operation of cooking consists very largely in the elimination of water and gases from the food and, while these are being evolved, it is inconceivable that one of them present as a constituent of the oven atmosphere should be absorbed by the food. These experiments demonstrate how improbable is such absorption.

There is another aspect of the sulphur question which does not usually receive attention, but which may become of importance to us. The following table is a sulphur balance for the carbonization process and the combustion of the carbonization products:

	Lb.	%
Sulphur in original coal at 1.63%	1.63	100
,, into atmosphere at works	0.25	15½
,, into ash at works	0.06	3¾
,, in by-products	0.50	30¾
,, in gas	0.02	1¼
,, into atmosphere from coke sold	0.60	36¾
,, into ash from coke sold	0.20	12¼
	1.63	100

The result of carbonizing the coal is that nearly half the sulphur of the coal is prevented from reaching the atmosphere, which is in itself a considerable step towards a purer atmosphere. The improvement is, however, not so great as is usually believed, but neither can the other "refined source of heat"—electricity—legitimately claim to have helped generally, since to provide a given quantity of heat in, say, a central heating installation, the average electricity generating station would emit to the atmosphere nearly eight times as much sulphur as would be the case if gas were used. In the case of electricity this objection has been met by the provision in some urban stations of elaborate and expensive flue-gas washing installations. In our case the difficulty is nothing like as great and the complete gasification processes would go far towards meeting it, since they have a high thermal efficiency of conversion and produce a gas of very low sulphur content. The matter can be treated entirely as a chemical engineering problem with which we are already familiar, and its solution, instead of being a financial burden, would have actual economic advantages. I have mentioned this aspect of the sulphur question because I think our conventional view, in considering only the sulphur in the gas, is a little too limited. The sulphur in the gas is only a part of the problem, and dealing with the major aspect may in large measure remove the smaller difficulty.

This brings me to the end of "Some Reflections on Matters of Importance to the Gas Industry." I am aware that what I have said is not of the character of the Lecture to which you have been accustomed, and this is accounted for by wartime conditions.